THE ROLE OF THE NURSE IN IDENTIFICATION AND PREVENTION OF SEPSIS IN PEDIATRIC INTENSIVE CARE UNITS

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Abstract: Nurses have a fundamental role in control and prevention of neonatal sepsis by following protocols, ethical norms and standards of good nursing practice. The lack of human resources has significant impact on intensive nursing care and to the quality of care. According to the WHO and according to scientific publications, in 2017 there were 48.8 million cases of sepsis and 11 million deaths related to sepsis, which represents almost 20% of all deaths worldwide. In 2017, almost half of the cases of sepsis were in children. The aim of the article is to focus on the main points of intensive care based on guidelines for neonatal and pediatric intensive care. As specialists who are close to the patient, nurses must have the necessary knowledge about the mechanisms of transmission of infections, know the main sources of contamination, follow the principles of asepsis when performing invasive procedures, observe the working concentration of antiseptic solutions for treatment. on surfaces, equipment and tools, to prepare medicines in strict compliance with the dose prescribed by a doctor, to use personal protective equipment and to perform proper hygienic treatment and disinfection of their hands. Materials amd methods: This article provides an overview of the main points of pediatric intensive care and prevention of sepsis. Results: Healthcare professionals are responsible not only for caring for patients, but also for taking a responsible approach for preventing the spread of infection by following guidelines. Neonatal sepsis is one of the most common causes of morbidity and mortality in newborns. This is one of the most common reasons for hospitalization of newborns in developed countries. Reducing neonatal mortality due to sepsis requires in-depth analysis of the problem, knowledge of epidemiology and risk factors, and early diagnosis and treatment are essential.
Keywords: nurse, intensive care, children, prevention, sepsis

1. INTRODUCTION

Newborns are at higher risk of developing sepsis due to insufficient time to build barrier mechanisms, features of individual reactivity of the organism, as well as continuous changes in adaptation processes throughout the neonatal period. There are also factors that reduce the anti-infective properties such as mechanical ventilation, prolonged catheterization of a peripheral or central vein, skin or mucosal defects, dysbacteriosis. Premature babies are more vulnerable to infections than full-term babies because the development of the immune system begins around the 24-th week of gestation and lasts until birth. Prolonged hospitalization, invasive procedures, parenteral nutrition and the use of broad-spectrum antibiotics in neonatal units increase the susceptibility of this population to various pathogens. Factors on the part of the mother are poor diet or physical activity, diseases during pregnancy, lack of control of infections during childbirth. Infections related to healthcare are also a serious problem due to the resistance of organisms. The number of patients with sepsis can be reduced by preventing the onset of infection and by preventing the infection from progressing to sepsis. According to the WHO, the main ways to prevent infections are good hand hygiene, which reduces the incidence of diarrhea in patients by 40%, reliable water supply and quality sanitation, reducing overall morbidity by 10%. Proper nutrition and safe food preparation reduce the rate of respiratory infections in children and cases of diarrhea.. The development of the infection into sepsis can be prevented by early recognition of the symptoms of sepsis, timely access to medical care and adequate antibiotic treatment. Sepsis affects 30 million people worldwide each year and causes 1 to 10 cases of maternal mortality. It is also a major cause of maternal turmoil in the 19th century [1]. Zemelweiss was the first to study the infectious origin of the disease and contributed to its prevention by introducing hand hygiene measures between births, which reduced the mortality rate due to puerperal sepsis in Vienna from 9% to 3% [2]. Aspects of good nursing practice focus on measures, guidelines and care protocols, which are also a sign of innovation in nursing practice. Intensive care follows strictly specific rules for the work of medical and non-medical staff, and the control by the head of the department or unit ensures the quality of the care provided.

There are strategies for preventing specific infections related to healthcare in intensive care units. These include measures against ventilator-associated pneumonia, catheter-related blood infections and urinary tract infections [3]. Proper intensive care aims to prevent the risk factors for infections and reducing the overall morbidity and mortality from infections and sepsis in intensive care units. Knowledge and skills are needed to apply the basic principles of prevention and control, as well as strict adherence to algorithms for work in performing nursing manipulations.

THE AIM of this article is to emphasize on the need of introducing measures for the prevention of sepsis in pediatric intensive care units.

2. MATERIAL AND METHODS

The results of the scientific achievements of various authors concerning the prevention of infections related to medical care and sepsis in intensive care units are presented through a descriptive method. The material mainly includes publications examining newborns and infections occurring in intensive care units such as ventilator-associated pneumonia, catheter-related infections and urinary tract infections.

3. RESULTS

The introduction of algorithms for various nursing procedures in the neonatal intensive care unit would significantly reduce the period of hospitalization of newborns, as well as the consequences for the body of complications of sepsis. Long-term goals aimed at training staff at different levels (respectively senior nurses, head nurses) would lead to increased control in intensive care units and reduce costs for medical institutions.

Aspiration of endotracheal secretions from the airways is one of the main manipulations in the intensive care unit, performed by a doctor and a nurse in order to ensure airway patency. The manipulation is risky for the staff and is performed with the use of personal protective equipment, providing protection against the spread of aerosols and secretions. There is evidence that hand hygiene is the most important part of infection control in all healthcare facilities, but also the most difficult strategy to implement. Gram-negative microorganisms colonizing the intubation tube have been shown to be transmitted by staff [4]. Ventilator-associated pneumonia is the most common healthcare associated infection and carries a high risk of death. This requires compliance with basic rules when caring for patients with an intubation tube or tracheostomy cannula. It is necessary to reoxygen the patient with 100% oxygen immediately before aspiration of secretions, follow aseptic technique and select the appropriate size aspiration catheter. Preoxygenation would significantly reduce hypoxemia due to aspiration of secretions. However, this manipulation could lead to adverse consequences for newborns. These include retinopathy of prematurity, parenchymal lung damage, free radical damage and oxygen metabolites [5].

It is important for the nurse to know the indications for the need for aspiration such as: increased oxygen demand, bradycardia or apnea, noisy breathing, shortness of breath or wheezing, aspiration data or visible secretions. Medical professionals must know the anatomical and physiological features of the newborn's respiratory system in order to take into account the size of the devices used in the aspiration of secretions. Failures in proper technique could lead to hemorrhage, atelectasis, hypoxia, lesions in the tracheal mucosa - complications that prolong the stay in the intensive care unit and the cost of treatment of newborns. Saturation and pulse rate, as well as the patient's facies, are monitored during the manipulation. Most available endotracheal aspiration algorithms require the disposal of a used catheter after rinsing with sterile physiological serum, but other publications suggest that consumables such as aspiration catheters and invasive patient hoses may last up to 7 days [6]. According to studies, this would also reduce hospital costs. The association between ventilator-associated pneumonia (VAP) and the use of patient respirator hoses for prolonged periods has not been established. [7]. Patients are monitored for desaturation, bradycardia, tachycardia, reduced or absent chest wall movements, visible secretions in the intubation tube, evidence of copious and / or dense secretions. The pressure during aspiration should be below 200 mmHg for adults and between 80-120 mmHg for newborns. In the last two decades, in addition to the open aspiration system, which includes dissection by the respirator and the use of an aspiration catheter, a closed aspiration system has become a standard practice. This is a safer way because the aspiration catheter is connected to some of the respirator hoses. There is no evidence that closed secretion aspiration reduces the incidence of ventilator-associated pneumonia [8]. The Centers for Disease Control and Prevention recommends strict sterilization of reusable respiratory resuscitation agents, use of sterile water in the humidification system, periodic removal of condensation in the respiratory chain, and hand hygiene before and after contact with respirators. The recommendations of the Centers for Disease Control and Prevention also do not include replacement of breathing hoses, unless they are visibly contaminated or mechanically damaged.

Catheter-associated blood infection occurs due to the use of various vascular catheters. Symptoms that may be observed are fever, chills, and in most cases disappear with the removal of the catheter. In some intensive care patients, complications of catheter-associated infection could lead to systemic inflammatory response syndrome (SIRS). Before starting antimicrobial therapy, it is necessary to perform an antibiogram and for this purpose two blood samples are taken - blood cultures. The first of the suspected contaminated catheter and second peripheral vein blood culture. The skin is disinfected with> 0.5% dermal disinfectant or povidone iodine [9]. In case of suspected infection after removal of the catheter, a tip is taken and sent for microbiological examination.

Umbilical venous catheters and peripheral venous cannulas are used primarily for parenteral nutrition in neonates through the administration of infusion solutions, medications, blood and blood products. However, the puncture site can be a gateway for microorganisms in case of non-compliance with the rules of asepsis and antiseptics. Possible sources of infection are the hands of medical professionals, microorganisms from the skin flora of newborns, as well as contaminated disinfectants. Infusion solutions and medications may be contaminated in preparation for drug therapy by the nurse. According to Schmid, Gudrun, 2018, secondary infection may also occur due to hematogenous spread of infection to other parts of the body. According to a study by Schmid, Geffers et al, conducted in the period 2002-2016, the introduction and use of preventive bands to reduce catheter-related blood infections in neonatal intensive care units has its advantages [10]. Premature newborns with catheter-associated infection increase the risk of stunted growth and development, neuropsychiatric health problems, which prolong hospital stays, and hospital costs.

4. DISCUSSION

More efforts are needed on the part of health professionals to focus on the prevention of healthcare associated infections in order to prevent sepsis in newborns. Continuing training of medical professionals is a good opportunity to create a training program aimed at complying with an algorithm for inserting and removing catheters. Studies have shown that chlorhexidine is used as a skin disinfectant in adults before cannulation or dressing change, but is not approved for children under two months of age, therefore efficacy in this age group cannot be studied. Chlorhexidine-impregnated dressings are also not recommended for newborns. The relationship between the occurrence of central venous catheter infections and the effect of chlorhexidine gluconate baths in newborns was studied. Newborns weighing 1,000 grams or less up to 28 days of age, as well as those weighing more than 1,000 grams, were bathed with soap and a towel impregnated with chlorhexidine gluconate. Infants weighing 1000 grams or less, aged over 28 days are bathed only with soap. The results show that central venous catheter infections are reduced in the group of chlorhexidine-treated neonates [11]. There is also a protocol for washing with chlorhexidine in newborns, and according to a study, increased exposure of Staphylococcus aureus to chlorhexidine 0.5% solution from 15 to 30 and 60 seconds reduces the number of colonies by 37%, 77% and 93%, respectively. It is necessary for the algorithm to be followed by the medical specialists when performing hygienic care for the newborn. It is important to wet the baby's body, face, eyes and ears with warm water. 1% white cream is applied all over the body except the eyes. All folds, perianal area, periumbilical area, axillae and neck folds should be treated. The scalp is massaged with chlorhexidine cream, which remains in contact with the skin for 60 seconds or more. Catheter-related urinary tract infections are among the most common infections, accounting for 40% of healthcare associated infections. Predisposing factors for their development are prolonged time of available urethral catheter, female sex, age, diabetes, placement of the catheter outside the operating room, lack of antibiotic therapy and disorders of the integrity of the closed system for collecting urine [12]. The responsibilities of the nurse also aimed at the prevention of risks and complications due to urinary tract infections are the correct selection of the number and type of catheter, adherence to aseptic technique and proper hygiene care. Urinary tract infections are more likely to occur in preterm infants than in preterm infants. Alternatives to collecting urine in collectors or urethral bags pose a high risk of contamination [13]. Identifying patients in neonatal intensive care units who are at increased risk of urinary tract infection would require microbiology sample. In extremely low birth weight infants, urinary tract infections are associated with increased cholestasis, CEC use and parenteral nutrition for several days, prolonged mechanical ventilation, and chronic lung disease [14].

5. CONCLUSION

The aim of optimizing nursing care by following the measures for prevention of infections related to medical care and sepsis is to reduce the number of new cases of nosocomial infections and complications requiring hospitalization and prolonged hospital stay. Highlights that would improve the prevention of sepsis in the intensive care units focus on nursing care not accidentally, due to the continuous intensive care and monitoring in these units. According to BULNOZO, all medical specialists providing health care must know the medical standard for prevention and control of nosocomial infections and observe its requirements in their practice. Not only measures to limit the spread of infections are important, but also the proper training of new nurses and the formation of habits that provide quality care for newborns. It is recommended that new team members in the intensive care unit be trained by a mentor with more experience in intensive care in order to smoothly adapt to intensive work and perform nursing manipulations according to algorithms and protocols for nursing care. Medical specialists should also use fluently their professional language, which is a good attestation in their everyday practice. Unfortunately medical specialists strive to unify the meaning of terms and phrases designating anatomical, clinical and pharmaceutical concepts which is fundamental for providing quality of care [15]. However, there is still a lack of comprehensive

research on patient benefit, quality improvement and efficiency of care provided by nursing staff. It is also advisable to assess the ability of nurses to make decisions and respond in an emergency. The role of the nurse in improving the quality of health care and disease prevention is growing worldwide. The need for highly qualified staff in the intensive care unit also emphasizes the importance of continuing education, additional qualifications and research developed by nurses in order to improve the quality of patient care.

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